

CLAIMS

We claim:

1. A computer-based method for assisting at least two parties involved in a negotiation problem with any number of issues toward achieving a mutually satisfactory agreement on
5 decisions to be taken on one or more of said issues comprising the steps of:

- a) providing at least one programmed computer system and an associated interactive graphical interface for interactive input and output of information to and from said computer system, said computer system being programmed to
 - generate at least one potential agreement on decisions to be taken on one or more of
10 said issues of said negotiation problem in response to entered preference data from each of said parties;
 - keep confidential any private information and display that information only to the party to whom that information belongs; and
 - display information that is not private, including mutually acceptable potential agreements, to all parties with permission to see that information.
- b) entering into said computer system through said graphical interface, information pertaining to each said party's preferences on the outcome of each of said issues involved in said negotiation problem;
- c) entering into said computer system for each of said parties confidential acceptance of one
20 or more potential agreements created by any party or the computer system; and
- d) in response to said entering of said information, said programmed computer system
 - using each party's inputted information to evaluate potential agreements in terms of a specified level of satisfaction according to each party's own preferences;
 - using said information to generate one or more potential agreements; and
 - declaring as a tentative agreement among two or more parties, any potential
25 agreement that has been accepted by those parties.

2. The computer-based method of claim 1, further including the steps of

- a) entering into said computer system through said graphical interface, tradeoff preference information determining relative issue importance; and
- b) entering into said computer system through said graphical interface, proposals and/or potential agreements (which may be declared private);

3. The computer-based method of claim 2, further including the steps of

- a) entering detailed tradeoff and satisfaction function preference information or other information from which that information may be derived and analyzing those preferences to determine said specified satisfaction levels more precisely; and
- b) using optimization techniques to generate an improved potential agreement that is Pareto optimal according to said entered preferences and displaying said improved potential agreement on said graphical interface.

4. The computer-based method of claim 3, further including the step of entering into said computer system other information from which said preference information may be derived, in an automated process not requiring a graphical interface.

5. The computer-based method of claim 4, further including the steps of:

- a) entering into said computer system changed preference information, including acceptance of potential agreements and/or retraction or previous acceptances and/or a different potential agreement; and,
- b) in response to said entering of said changed preference information, said programmed computer system generating one or more new potential agreements.

6. The computer-based method of claim 5, wherein said steps in response to said entering of said information, optionally include said programmed computer system:

- a) identifying a plurality of potential agreements, one for each of said parties, each said potential agreement being acceptable to its corresponding party and providing a specified level of satisfaction for that party;

- b) if said plurality of potential agreements are not identical to one another, generating a potential agreement that is different from said plurality of potential agreements, using optimization techniques to analyze said preference information and provide a level of satisfaction for each said party that is at least as great as the level of satisfaction provided by each said party's acceptable potential agreement; and,
- c) displaying said generated potential agreement on said interactive graphical interface for consideration by parties to accept as a tentative agreement to said negotiation problem.

7. The computer-based method of claim 6, wherein said step of providing at least one computer system and an associated interactive graphical interface further comprises:

- a) providing a plurality of independent, separate computer systems and associated interactive graphical interfaces, one each for each of said parties, each said independent, separate computer system being programmed to receive and process information from each party, including that pertaining to each of said party's preferences on the outcome of each said issue involved in said conflict; and,
- b) providing a central computer system located at a neutral site and a plurality of communication links connecting each of said independent, separate computer systems to said central computer system, said central computer system being programmed to receive preference information from each of said independent, separate computer systems, generate at least one potential agreement to the negotiation problem in response to entered preference information from each of said independent, separate computer systems, and securely transmit generated information and other information to be communicated between parties;

wherein, the information pertaining to each of said party's preferences remains confidential to each party.

8. The computer-based method of claim 1, further including the step of entering into said computer system other information from which said preference information may be derived, in an automated process not requiring a graphical interface.

9. The computer-based method of claim 1, further including the steps of:

c) entering into said computer system changed preference information, including acceptance of potential agreements and/or retraction or previous acceptances and/or a different potential agreement; and,

5 d) in response to said entering of said changed preference information, said programmed computer system generating one or more new potential agreements.

10. The computer-based method of claim 1, wherein said steps in response to said entering of said information, optionally include said programmed computer system:

10 d) identifying a plurality of potential agreements, one for each of said parties, each said potential agreement being acceptable to its corresponding party and providing a specified level of satisfaction for that party;

15 e) if said plurality of potential agreements are not identical to one another, generating a potential agreement that is different from said plurality of potential agreements, using optimization techniques to analyze said preference information and provide a level of satisfaction for each said party that is at least as great as the level of satisfaction provided by each said party's acceptable potential agreement; and,

f) displaying said generated potential agreement on said interactive graphical interface for consideration by parties to accept as a tentative agreement to said negotiation problem.

20 11. The computer-based method of claim 1, wherein said step of providing at least one computer system and an associated interactive graphical interface further comprises:

25 providing a plurality of independent, separate computer systems and associated interactive graphical interfaces, one each for each of said parties, each said independent, separate computer system being programmed to receive and process information from each party, including that pertaining to each of said party's preferences on the outcome of each said issue involved in said conflict; and,

providing a central computer system located at a neutral site and a plurality of communication links connecting each of said independent, separate computer systems to said

central computer system, said central computer system being programmed to receive preference information from each of said independent, separate computer systems, generate at least one potential agreement to the negotiation problem in response to entered preference information from each of said independent, separate computer systems, and securely transmit generated information and other information to be communicated between parties;

wherein, the information pertaining to each of said party's preferences remains confidential to each party.

12. A computer-based apparatus for assisting at least two parties involved in a negotiation problem with any number of issues toward achieving a mutually satisfactory agreement on decisions to be taken on one or more of said issues, comprising:

- a) a plurality of independent, separate computer systems, one for each of said parties, each said computer system being programmed to receive and process communication between parties and/or other information pertaining to each said party's preferences on the outcome of each issue involved in said negotiation problem, including proposals and confidential acceptance of any potential agreement;
- b) a plurality of interactive graphical interfaces connected, one each, to each of said independent and separate computer systems for input and output of information to and from the corresponding one of said computer systems;
- c) a central computer system located at a neutral site for

- processing preference information received from each of said independent separate computer systems;
- generating one or more potential agreements to the negotiation problem in response to the inputted preference information from each of said parties, such that said potential agreements fall between other potential agreements created by the parties or the system;
- receiving acceptance from each party on any number of existing potential agreements;

- maintaining each said party's preference information confidential from every other one of said parties;
- when two or more parties accept the same potential agreement, declaring a tentative agreement among said parties; and

5 d) communication link means connecting each of said independent, separate computer systems with said central computer system.

10 13. The computer-based apparatus of claim 12, wherein said central computer system is further programmed for generating a new potential agreement from a plurality of existing potential agreements, one for each of said parties, comprised of potential decisions to be taken on at least one of said issues, each said existing potential agreement being communicated to said central computer system from the corresponding one of said plurality of independent, separate computer systems, each said potential agreement being acceptable to its corresponding party and providing a specified level of satisfaction for that party, said new potential agreement being generated from said plurality of acceptable potential agreements and preference information from each party using optimization techniques so that said generated potential agreement provides a level of satisfaction to each said party that is at least as great as the level of satisfaction provided by each said party's acceptable potential agreement.

15 14. The computer-based apparatus of claim 13, wherein said central computer system is further programmed for generating an improved potential agreement from said tentative agreement that is Pareto optimal according to said information pertaining to each said party's preferences.

20 15. The computer-based apparatus of claim 12, wherein said central computer system is further programmed for generating an improved potential agreement from said tentative agreement that is Pareto optimal according to said information pertaining to each said party's preferences.

25 16. A computer-based method for assisting at least two parties involved in a negotiation problem with any number of issues toward achieving an optimal mutually satisfactory agreement on decisions to be taken on one or more of said issues comprising the steps of:

- a) providing a plurality of independent, separate computer systems, one for each of said parties, each said independent, separate computer system being programmed to receive and process information pertaining to each of said party's preferences on the outcome of each said issue involved in said conflict;
- 5 b) providing a central computer system located at a neutral site and a plurality of communication links connecting each of said independent, separate computer systems to said central computer system, said central computer system being programmed to receive preference information from each of said independent, separate computer systems and generate at least one potential agreement to the negotiation problem in response to
- 10 entered preference information from each of said independent, separate computer systems;
- c) each party entering into their corresponding one of said independent, separate computer systems,
- information to be communicated to other parties; and/or
 - preference information; including bargaining range information, satisfaction function information for each of said issues, information defining tradeoffs between issues, and any number of potential agreements, which said potential agreements may be private or not and accepted or not; or
 - any other information from which such said preference information may be derived;
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- 20 d) transmitting said preference information from each of said independent, separate computer systems to said central computer system;
- e) said central computer system processing said transmitted preference information from all parties and generating any number of potential agreements to the said negotiation problem;
- 25 f) transmitting any said generated potential agreements and any other said information to be communicated to other parties from the said central computer system to the appropriate said independent, separate computer systems;
- g) each party responding to said transmitted information by changing preference information, creating new potential agreements and/or accepting any number of potential
- 30 agreements transmitted from the said central computer system;

- h) transmitting said response from each of said independent, separate computer systems to said central computer system;
- i) said central computer system declaring a tentative agreement if two or more parties have accepted the same potential agreement and transmitting that information to the appropriate said independent, separate computer systems; and
- j) repeating any of the above steps any number of times.

17. The computer-based method of claim 16, further including the steps of

- a) if two or more parties involved in said negotiation problem have both accepted any said potential agreement, then at the option of the parties, causing said central computer system to generate an improved potential agreement that is Pareto optimal according to said entered preference information; and
- b) repeating the above step any number of times.